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Title : Quantitative analyses of flipper rubbing behavior in wild Indo-Pacific bottlenose dolphins (*Tursiops aduncus*)

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Abstract : "Flipper rubbing" behavior in which a dolphin rubs another dolphin with its pectoral fin has been reported in many cetacean species. For this behavior, however, we still have no precise research with quantitative analyses necessary to understand its function. We studied flipper rubbing behavior of wild Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) at Mikura Island, Tokyo, Japan. We video-recorded 561 flipper rubs and quantitatively analyzed these rubs for use. In all cases, a pair of dolphins (Rubber and Rubbee) exchanged flipper rubs while swimming in the same direction, and the Rubber contacted the Rubbee's body with the frontal edge of the flipper near the tip. Rubbers rubbed Rubbee's face (N=109) and pectoral fin (N=40) significantly more frequently than expected from the rate of these parts in the total body surface area. In this behavior, the Rubber tended to keep a horizontal posture (97.2%) while the Rubbee assumed a different posture (57.6%, e.g., upside-down) more often. Also, in most cases (74.8%), the Rubbee moved the part of its body touching the Rubber's flipper as if it were scratching an itch. In addition, many flipper rubs were initiated by the Rubbee approaching the Rubber (77.5%) and ended with the Rubber separating from the Rubbee (64.7%). These results suggest that the Rubbee was the primary initiator of this behavior and received some benefit, such as body-cleaning, at a cost to the Rubber. Dolphins of the same sex in same-age classes tended to exchange flipper rubbing most often. Also, this behavior from male to female was significantly more frequent than that from female to male. Additionally, flipper-to-flipper rubbing between mother and calf was not observed. These facts suggest that dolphins choose their rubbing partner and that this behavior has a significant social function. Our results suggest that flipper rubbing by bottlenose dolphins has a similar characteristic to grooming in primates.